

2016 LONG-TERM MONITORING DATA SUMMARY REPORT ST. LAWRENCE RIVER REMEDIATION PROJECT

Prepared for

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ACRONYMS AND ABBREVIATIONS

ESD	Explanation of Significant Differences
LTMP	Long-Term Monitoring Plan
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
ng/kg	nanograms per kilogram
Pace	Pace Analytical, Inc.
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
QA/QC	quality assurance
QC	quality control
SAV	submerged aquatic vegetation
Site	St. Lawrence River Remediation Project located adjacent to the Alcoa Massena East Plant in Massena, New York
SLRRP	St. Lawrence River Remediation Project
TDBF	total dibenzofurans
TOC	total organic carbon
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
YOY	young-of-year

1 INTRODUCTION

This document presents the results of the Year 7 (2016) long-term monitoring for the St. Lawrence River Remediation Project (SLRRP) located adjacent to the Alcoa Massena East Plant (former Reynolds Metals Company, LLC) in Massena, New York (Site; Figure 1-1). This monitoring was conducted in accordance with the Site Long-Term Monitoring Plan (LTMP; Anchor QEA and ARCADIS, May 2012a), LTMP Addendum (Anchor QEA and ARCADIS, September 2012), and LTMP Summary Matrix for Years 6-10 (Alcoa, November 2015).

1.1 Long-Term Monitoring Program Objectives

As detailed in the LTMP and LTMP Addendum, specific objectives of the program are as follows:

- Verify that the cap armor layer remains intact
- Evaluate trends in young-of-year (YOY) fish tissue concentrations within the remediation area and at an upstream background area
- Document the benthic community present in the capped cells, in a subset of the dredged cells, and at upstream background locations
- Document the sediment quality of the 2009 post-cap habitat layer and surface sediment concentrations in the cells dredged in 2001
- Estimate the presence and density of submerged aquatic vegetation (SAV) within the 2001 and 2009 dredged and capped areas and at upstream background locations
- Assess the survival of the willow and dogwood plantings along the shoreline
- Conduct adult fish monitoring to provide data on fish tissue concentrations at the request of the United States Environmental Protection Agency (USEPA)

Monitoring activities that have been conducted to satisfy those objectives include the following:

- Monitoring the physical integrity of the cap (i.e., verification of cap presence)
- Fish monitoring (YOY and adult species)
- Benthic community invertebrate survey

- Sediment sampling
- SAV surveying
- Shoreline restoration monitoring

Details regarding the 2016 long-term monitoring activities are provided in this report, and a summary of the previous monitoring events (Years 1 through 5 or 2010 through 2014) are included in each year's respective Long-Term Monitoring Data Summary Report (Anchor QEA and ARCADIS, March 2011, May 2012b, February 2013, February 2014, and October 2015). No long-term monitoring activities were performed in 2015 (adult fish monitoring only scheduled) as USEPA requested that the fish monitoring be postponed to 2016 (USEPA, 2015).

1.2 Document Organization

Details regarding the 2016 long-term monitoring field efforts and results are provided in Section 2 of this report. Section 3 presents a summary of the activities conducted each year during the long-term monitoring program, along with a matrix of the monitoring work to be performed through 2019. References cited as sources for this document are provided in Section 4. Appendix A presents the data validation report.

2 LONG-TERM MONITORING PROGRAM

Components of the long-term monitoring program performed in 2016 included the following:

- Fish monitoring
 - YOY monitoring
 - Adult monitoring
- Sediment sampling

The approach and discussion of results for fish monitoring and sediment sampling are presented in Sections 2.1 and 2.2, respectively.

2.1 Fish Monitoring

Resident fish sampling and processing was performed August 22-26 and September 6, 7, 13, 15, and 26-28, 2016 at the Site, downstream of the Site, and at an upstream background area in accordance with the LTMP (Anchor QEA and ARCADIS, May 2012a) and the LTMP Addendum (Anchor QEA and ARCADIS, September 2012). Sampling efforts included the collection of YOY and adult fish; sample locations are shown on Figures 2-1 and 2-2. The objective of the YOY sampling is to evaluate trends in polychlorinated biphenyl (PCB) fish tissue concentrations within the remediation area of the Site and at an upstream background area in the St. Lawrence River. The objective of the adult fish sampling is to provide data on the PCB fish tissue concentrations within the remediation area of the Site, along the southern shoreline between the downstream Site boundary in the vicinity of the bridge to Canada and the upstream boundary of Racer Trust (formerly General Motors), and at an upstream background area in the St. Lawrence River. This was the fifth YOY fish sampling event (sampling occurred previously in 2010, 2011, 2012, and 2014) and the second adult fish sampling event (sampling occurred previously in 2012).

2.1.1 YOY Monitoring

2.1.1.1 Methods

In accordance with the LTMP (Anchor QEA and ARCADIS, May 2012a), YOY spottail shiners (*Notropis hudsonius*) were targeted from the Site and from a background location upstream of the Robert Moses-Saunders Power Dam in the vicinity of Barnhart Island. Sampling locations are shown on Figures 2-1 and 2-2. Fish were collected using a boat-mounted electrofishing unit and submitted for analysis of PCB Aroclors and lipids in whole-body composites. At the request of USEPA, a subset of samples was also analyzed for dibenzofurans. Ten whole-body YOY spottail shiner composite samples were collected from the Site remediation area, and five whole-body YOY spottail shiner composite samples were collected from the upstream background area (Figures 2-1 and 2-2). Fish were collected from across the Site and background area and composited to form the required number of samples. As such, the sample results are representative of fish captured within the sample areas, rather than at individual locations. Each whole-body YOY spottail shiner sample contained between 15 and 50 individual fish, with fewer fish in samples submitted for PCB analysis only and more fish in samples submitted for both PCB and dibenzofuran analysis to meet analytical testing volume requirements. The number of fish, minimum and maximum size range of fish per sample, and the total weight of each sample are presented in Table 2-2.

All YOY spottail shiner samples were packaged in the field and shipped to Pace Analytical, Inc. (Pace) in Schenectady, New York, for processing and analysis. All whole-body samples were analyzed for PCBs (Aroclor; Method 8082) and percent lipids (gravimetric method), and four samples were also analyzed for dibenzofurans (Method 8290; three from the Site area and one from the background area). Quality assurance/quality control (QA/QC) consisted of one matrix spike (MS) sample and one matrix spike duplicate (MSD) sample prepared by the laboratory. Data validation was performed on the chemistry data, and all data were determined to be usable as reported from the laboratory. A data validation report prepared based on the analytical method and USEPA guidelines is provided in Appendix A.

2.1.1.2 Results

Analytical results for the YOY spottail shiner samples are presented in Table 2-2 for PCBs and Table 2-3 for dibenzofurans. PCB results in 2016 from the Site ranged from non-detect

(at a reporting limit of 0.05 milligrams per kilogram [mg/kg]) to 0.052 mg/kg with a mean of 0.028 mg/kg wet weight (half the reporting limit of 0.05 mg/kg is used to calculate means for non-detect sample results). Lipid-normalized PCB results ranged from 0.46 to 5.2 mg/kg-lipid with a mean of 1.4 mg/kg-lipid (half the reporting limit of 0.05 mg/kg is used to calculate lipid-normalized values for non-detect sample results). All background samples were non-detect for PCBs (at a reporting limit of 0.05 mg/kg) with a mean of 0.025 mg/kg wet weight. Lipid-normalized PCB results for the background samples ranged from 0.53 to 0.71 mg/kg-lipid with a mean of 0.62 mg/kg-lipid. Of the ten dibenzofuran compounds analyzed for, as presented in Table 2-3, the results for both the Site and upstream background samples were non-detect except for 2,3,7,8-TCDF, which was detected in all Site samples (n=3) but not the upstream background sample (n=1). The 2,3,7,8-TCDF results ranged from 1.6 to 1.7 nanograms per kilogram (ng/kg) with a mean of 1.7 ng/kg for the Site samples. The background location for 2,3,7,8-TCDF was non-detect at a reporting limit of 1.0 ng/kg.

Mean PCB concentrations in whole-body YOY spottail shiner samples at the Site in 2016 were the lowest concentrations observed over the course of the monitoring program with continued declines observed from 2010 to 2016 (Figure 2-3). Mean wet weight PCB concentrations in 2010 at the Site were 0.92 mg/kg (range of 0.49 to 1.3 mg/kg) compared to 0.41 mg/kg (range of 0.28 to 0.76 mg/kg) in 2011, 0.23 mg/kg (range of 0.12 to 0.33 mg/kg) in 2012, 0.15 mg/kg (range of 0.07 to 0.48 mg/kg) in 2014, and 0.028 mg/kg (range of non-detect to 0.052 mg/kg) in 2016. Lipid-normalized PCB results showed similar declines, with mean concentrations at the Site in 2010 of 24 mg/kg-lipid (range of 11 to 65 mg/kg-lipid) compared to 7.2 mg/kg-lipid in 2011 (range of 4.8 to 12 mg/kg-lipid), 4.8 mg/kg-lipid (range of 2.8 to 8.3 mg/kg-lipid) in 2012, 2.5 mg/kg-lipid (range of 1.2 to 7.3 mg/kg-lipid) in 2014, and 1.4 mg/kg-lipid (range of 0.46 to 5.2 mg/kg-lipid) in 2016. PCBs were non-detect in the upstream background area in all sampling years (2010 to 2012, 2014, and 2016) (Figure 2-3). As such, mean lipid-normalized PCBs in YOY fish in the upstream background area in all sampling years are low and generally similar (Figure 2-3).

Dibenzofuran concentrations in whole-body YOY spottail shiner samples at the Site decreased between years (2010 to 2012, 2014, and 2016) with the lowest concentrations observed in 2014 and 2016 (three Site samples and one background sample each per year). As noted above, 2,3,7,8-TCDF was the only compound detected, and was present in all Site

samples for all years and in the upstream background samples for all years except 2016. The mean 2,3,7,8- TCDF concentration at the Site in 2010 was 3.5 ng/kg (range of 3.2 to 3.7 ng/kg) compared to 3.3 ng/kg in 2011 (range of 3.1 to 3.5 ng/kg), 2.5 ng/kg in 2012 (range of 2.1 to 2.8 ng/kg), and 1.7 ng/kg in 2014 (range of 1.5 ng/kg to 2.0 ng/kg). Background results were similar between years at 0.53 ng/kg in 2010, 0.56 ng/kg in 2011, 0.58 ng/kg in 2012, 0.62 ng/kg in 2014, and non-detect in 2016 (less than 1.0 ng/kg).

2.1.2 Adult Fish

2.1.2.1 Methods

In accordance with the LTMP Addendum (Anchor QEA and ARCADIS, September 2012), adult (greater than or equal to 25 centimeters [cm]) smallmouth bass (*Micropterus dolomieu*) and adult brown bullhead (*Ictalurus nebulosus*) were targeted for collection from the Site, along the southern shoreline between the downstream Site boundary in the vicinity of the bridge to Canada and the upstream boundary of Racer Trust (formerly General Motors) (location referred to the area downstream of the Site), and from a background location upstream of the Robert Moses-Saunders Dam. Sampling locations are shown on Figures 2-1 and 2-2. Fish were collected using a boat-mounted electrofishing unit, with some limited bottom-set angling for bullhead, and were submitted for analysis of PCB Aroclors and lipids in edible fillets.

Six individual smallmouth bass samples were collected from the upstream background area, Site remediation area, and the area downstream of the Site (Figures 2-1 and 2-2). Six individual brown bullhead were collected from the upstream background area, and a combination of brown bullhead and white sucker (*Catostomus commersoni*) were collected from the Site remediation area and area downstream of the Site to complete the sample size (Figure 2-2; 1 brown bullhead/5 white sucker and 3 brown bullhead/3 white sucker, respectively). White sucker were collected as a substitute species due to limited availability of brown bullhead. In total, 18 adult bass and 18 adult bullhead/white sucker samples were collected.

All samples were packaged in the field and shipped to Pace for processing and analysis. All samples were analyzed for PCBs (Aroclor Method 8082) and lipids in edible fillets. QA/QC

consisted of one MS sample and one MSD sample prepared by the laboratory. Data validation was performed on the chemistry data, and all data were determined to be usable as reported from the laboratory. A data validation report prepared based on the analytical method and USEPA guidelines is provided in Appendix A.

2.1.2.2 Results

Analytical PCB results for all smallmouth bass and brown bullhead/white sucker samples are presented in Table 2-4.

Smallmouth bass PCB results in 2016 from the Site ranged from 0.90 to 7.1 mg/kg with a mean of 3.3 mg/kg wet weight. Lipid-normalized PCB results ranged from 49 to 263 mg/kg-lipid with a mean of 160 mg/kg-lipid. Brown bullhead/white sucker PCB results from the Site ranged from non-detect (at a reporting limit of 0.05 mg/kg with half the reporting limit used for calculations for non-detect samples) to 0.29 mg/kg with a mean of 0.069 mg/kg. Lipid-normalized PCB results ranged from 3.9 to 34 mg/kg-lipid with a mean of 11 mg/kg-lipid.

Smallmouth bass PCB results from downstream of the Site ranged from 0.44 to 11 mg/kg with a mean of 2.7 mg/kg. Lipid-normalized PCB results ranged from 18 to 523 mg/kg-lipid with a mean of 133 mg/kg-lipid. Brown bullhead/white sucker sample PCB results from downstream of the Site ranged from non-detect (at a reporting limit of 0.05 mg/kg) to 2.4 mg/kg with a mean of 0.43 mg/kg. Lipid-normalized PCB results ranged from 2.2 to 103 mg/kg-lipid with a mean of 29 mg/kg-lipid.

Smallmouth bass PCB results from the background area ranged from non-detect (at a reporting limit of 0.05 mg/kg) to 0.22 mg/kg with a mean of 0.070 mg/kg. Lipid-normalized PCB results ranged from 0.70 to 7.9 mg/kg-lipid with a mean of 2.3 mg/kg-lipid. All brown bullhead background samples were non-detect for PCBs (at a reporting limit of 0.05 mg/kg). Lipid-normalized values for brown bullhead background samples ranged from 1.3 to 2.6 mg/kg-lipid with a mean of 1.9 mg/kg-lipid.

Mean PCB concentrations in smallmouth bass samples in 2016 were generally higher than in 2012 at the Site and downstream of the Site locations. Mean wet weight PCB concentrations

in 2016 at the Site were 3.3 mg/kg (range of 0.90 to 7.1 mg/kg) compared to 0.79 mg/kg (range of 0.33 to 2.3 mg/kg) in 2012. Mean lipid-normalized PCB results in 2016 at the Site were 160 mg/kg-lipid (range of 49 to 263 mg/kg-lipid) compared to 31 mg/kg-lipid (range of 11 to 81 mg/kg-lipid) in 2012. Mean wet weight PCB concentrations in smallmouth bass in 2016 downstream of the Site were 2.7 mg/kg (range of 0.44 to 11 mg/kg) compared to 0.14 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 0.43 mg/kg) in 2012. Mean lipid-normalized PCB results in 2016 downstream of the Site were 133 mg/kg-lipid (range of 18 to 523 mg/kg-lipid) compared to 12 mg/kg-lipid (range of 1.0 to 37 mg/kg-lipid) in 2012. Mean wet weight PCB concentrations in smallmouth bass in the upstream background in 2016 and 2012 were comparable at 0.070 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 0.22 mg/kg) and 0.010 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 0.28 mg/kg), respectively. Lipid-normalized PCB results in the upstream background in 2016 and 2012 were also comparable at 2.3 mg/kg-lipid (range of 0.70 to 7.9 mg/kg-lipid) and 3.0 mg/kg-lipid (range of 0.74 to 8.7 mg/kg-lipid), respectively.

Mean PCB concentrations in brown bullhead/white sucker samples in 2016 were generally comparable to or lower than PCB concentrations observed in 2012 at the Site and downstream of the Site locations, except for one sample downstream of Site in 2016. Mean wet weight PCB concentrations in 2016 at the Site were 0.069 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 0.29 mg/kg) compared to 0.48 mg/kg (range of 0.075 to 0.96 mg/kg) in 2012. Mean lipid-normalized PCB results in 2016 at the Site were 11 mg/kg-lipid (range of 3.9 to 34 mg/kg-lipid) and 43 mg/kg-lipid (range of 19 to 73 mg/kg-lipid) in 2012. Mean wet weight PCB concentrations in brown bullhead/white sucker in 2016 downstream of the Site were 0.43 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 2.4 mg/kg) compared to 0.29 mg/kg (range of non-detect [at a reporting limit of 0.05 mg/kg] to 0.68 mg/kg) in 2012. [Note: bullhead sample FS9-1892-BB in 2016 had a PCB value of 2.4 mg/kg while all other bullhead/white sucker samples from the downstream of the Site location had PCB values of 0.12 mg/kg or non-detect]. Mean lipid-normalized PCB results in 2016 downstream of the Site were 29 mg/kg-lipid (range of 2.2 to 103 mg/kg-lipid) compared to 29 mg/kg-lipid (range of 1.7 to 70 mg/kg-lipid) in 2012. All brown bullhead background samples in 2016 and 2012 were non-detect for PCBs (at a reporting limit of 0.05 mg/kg). Lipid-normalized PCB results in the upstream background in 2016 and 2012 were

also comparable at 1.9 mg/kg-lipid (range of 1.3 to 2.6 mg/kg-lipid) and 1.7 mg/kg-lipid (range of 0.71 to 3.9 mg/kg-lipid), respectively.

2.2 Sediment Sampling

Sediment sampling was performed to document the characteristics of the post-cap habitat layer placed in 2009 and surface sediment concentrations in cells dredged in 2001 with no subsequent cap placement in 2009. Sampling activities were conducted on September 26 and 27, 2016.

2.2.1 Methods

Sediment sampling was conducted consistent with the protocol described in the LTMP (Anchor QEA and ARCADIS, May 2012a). Surface sediment was collected with a petite ponar grab sampler. A total of 36 sampling locations were targeted as part of this effort (Figure 2-4), with 10 samples collected within capped cells (also co-located with the 2011/2013 benthic community macroinvertebrate survey locations) and the remaining 26 samples collected from the cells dredged in 2001 that exceeded the 10 parts per million (ppm) polycyclic aromatic hydrocarbon (PAH) cleanup goal after dredging, but were not capped in 2009 in accordance with the Explanation of Significant Differences (ESD; USEPA, December 2008). These samples were collected from cells with pre-ESD PAH concentrations in the range of 10 to 20 ppm (supplemental uncapped cells). Note that three of the targeted locations (C-88, C-89, and D-117/D-118) were abandoned and not sampled due to lack of recoverable materials (large cobble and rock present).

Sediment grab samples were observed for physical characteristics, including general soil type (sand, silt, clay, and organic matter/other matter), as determined using the Unified Soil Classification System (USCS), and approximate grain size category (fine, medium, coarse).

All samples were shipped to Pace for laboratory analysis. All samples from the capped areas were submitted for percent moisture, total organic carbon (TOC), PCBs (Aroclor, Method 8082), and PAHs (Method 8270C). All samples from the supplemental uncapped cells were submitted for percent moisture, TOC, and PAHs (Method 8270C). Note that two of the samples (D-96 and D-122) were not analyzed for PAHs by the laboratory due to lack of

sample volume; the laboratory instead tested the available material for TOC without consulting with the project team. A subset of samples was also analyzed for total dibenzofurans (TDBF; Method 8290), including one sample from the uncapped cells and three samples from the capped cells. QA/QC protocols consisted of one blind duplicate sample per 20 samples, one MS/MSD sample per 20 samples, and rinse blank samples collected before and after sampling. These samples were analyzed for either PCBs (Aroclor), PAHs, and/or TDBFs. Data validation was performed on the chemistry data, and all data were determined to be usable as reported from the laboratory. A data validation report prepared based on the analytical method and USEPA guidelines is provided in Appendix A.

2.2.2 Results

Sediment PAH, PCB, TDBF, TOC, and percent moisture results are presented in Table 2-4.

Total PAH results for the September 2016 sampling event for the capped locations ranged from non-detect to 0.52 mg/kg. The total PAH results from the supplemental uncapped locations were all less than 10 mg/kg (range of 0.042 to 8.7 mg/kg), with the exception of two cells between 10 and 20 mg/kg (D-27 result was 15.7 mg/kg and D-116 result was 10.8 mg/kg) and two cells above 20 mg/kg (A-20 result was 26.6 mg/kg and C-7 result was 86.3 mg/kg).

Total PCB results for the capped locations were below 1 mg/kg (ranged from non-detect to 0.58 mg/kg), except D-126 which was slightly over 1 mg/kg (result was 1.4 mg/kg). Four of the six supplemental uncapped cells had non-detect PCB levels, with the result from A-20 at 9.5 mg/kg and D-108 at 2.4 mg/kg.

TDBF results from the three capped locations ranged from non-detect to 25.0 nanograms per kilogram (ng/kg); the result from the one supplemental uncapped location (C-9) was 71.7 ng/kg.

The average TOC results for the capped locations ranged from 1,100 mg/kg to 19,000 mg/kg and averaged 6,598 mg/kg. The TOC results for the supplemental uncapped locations were higher with results ranging from 2,200 mg/kg to 84,200 mg/kg (average 12,879 mg/kg).

In general, there is some variability when considering the results from the 2011, 2013, and 2016 sediment sampling efforts. Sampling efforts are performed in the same cells, but not the exact same location so variability in results is to be expected. Overall, results are typically lower than the ROD/ESD values with some outliers from year to year.

3 SCHEDULE

2016 represents Year 7 of the SLRRP LTMP. The monitoring results from the initial 5-year monitoring period (2010 through 2014) were summarized in five previous annual reports submitted to USEPA (Anchor QEA and ARCADIS, March 2011, May 2012b, February 2013, February 2014, and October 2015), and served as the basis for the Third Five Year Review Report (USEPA, August 2016). As outlined in USEPA's 2016 five-year review, continued monitoring is required over the next 5-year period (2015 through 2019) and results from these efforts will be used as the basis for the next required 5-year National Contingency Plan review.

The following matrix summarizes the overall schedule for the LTMP components through Year 10 (2019).

Monitoring Activity	Years 1-5					Years 6-10				
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Physical Condition of the Cap	X	X	X	X	X			X		
YOY Fish Monitoring	X	X	X		X		X		X	
Adult Fish Monitoring			X				X		X	
Benthic Community Survey		X		X				X		
Sediment Sampling		X		X			X			
SAV Survey		X		X				X		
Shoreline Restoration Monitoring	X	X		X		Not applicable				

Note that shoreline restoration monitoring is no longer required based on the results of the survey activities performed in 2011 and 2013.

4 REFERENCES

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TABLES

Table 2-1
2016 Resident Fish Monitoring - Young-of-Year Spottail Shiner Field Data and PCB Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Species	Sample Area	Sample ID	Date Collected	Fish per Sample	Length Range (cm)	Weight (g)	Lipid (percent)	PCB (mg/kg wet)	PCB (mg/kg-lipid)
Spottail Shiner	Site	FS7-1848-SS	8/22/16	15	4.9 - 6.0	24	0.483	ND (0.05)	5.2
		FS7-1849-SS	8/22/16	15	4.4 - 6.5	20	0.998	ND (0.05)	2.5
		FS7-1850-SS	8/22/16	15	4.3 - 5.1	19	3.02	ND (0.0511)	0.85
		FS7-1851-SS	8/22/16	15	4.2 - 5.6	20	2.19	ND (0.05)	1.1
		FS7-1852-SS	8/22/16	15	4.9 - 6.3	22	3.19	ND (0.05)	0.78
		FS7-1853-SS	8/22/16	15	4.7 - 6.4	21	4.25	ND (0.05)	0.59
		FS7-1854-SS	8/22/16	50	4.9 - 6.6	60	5.40	ND (0.05)	0.46
		FS7-1855-SS	8/22/16	15	4.4 - 6.0	16	2.62	ND (0.05)	1.0
		FS7-1856-SS	8/22/16	50	5.0 - 6.4	57	2.96	ND (0.05)	0.84
		FS7-1857-SS	8/22/16	50	5.0 - 6.6	63	5.03	0.052	1.0
	Background	FS8-1909-SS	8/24/16	17	5.7 - 6.5	30	4.25	ND (0.05)	0.59
		FS8-1910-SS	8/24/16	17	5.5 - 6.7	31	3.68	ND (0.05)	0.68
		FS8-1911-SS	8/24/16	17	5.8 - 6.8	33	3.52	ND (0.05)	0.71
		FS8-1912-SS	8/24/16	17	5.3 - 6.6	31	4.27	ND (0.05)	0.59
		FS8-1913-SS	8/24/16	50	5.3 - 6.7	90	4.69	ND (0.05)	0.53

Notes:

1. Approximate sample collection locations are shown on Figures 2-1 and 2-2.
2. Additional fish were collected for FS7-1854-SS, FS7-1856-SS, FS7-1857-SS, and FS8-1913-SS as these composite samples were analyzed for PCBs and dibenzofurans (see Table 2-2).
3. cm = centimeter
4. g = gram
5. mg/kg wet = milligrams per kilogram wet weight
6. mg/kg-lipid = milligrams per kilogram lipid normalized; half the detection limit was used for calculating lipid-normalized PCB concentrations for non-detect samples
7. ND = non-detect; the value in parenthesis is the associated reporting limit

Table 2-2
2016 Resident Fish Monitoring - Young-of-Year Spottail Shiner Dibenzofuran Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Species	Spottail Shiner			
Sample Area	Site			Background
Sample ID	FS7-1854-SS	FS7-1856-SS	FS7-1857-SS	FS8-1913-SS
Date Collected	8/22/16	8/22/16	8/22/16	8/24/16
2,3,7,8-TCDF (ng/kg)	1.7	1.7	1.6	ND (1.0)
1,2,3,7,8-PeCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
2,3,4,7,8-PeCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
1,2,3,4,7,8-HxCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
1,2,3,6,7,8-HxCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
2,3,4,6,7,8-HxCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
1,2,3,7,8,9-HxCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
1,2,3,4,6,7,8-HpCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
1,2,3,4,7,8,9-HpCDF (ng/kg)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
OCDF (ng/kg)	ND (10.0)	ND (10.0)	ND (10.0)	ND (10.0)

Notes:

1. Approximate sample collection locations are shown on Figures 2-1 and 2-2.
2. ng/kg = nanograms per kilogram
3. ND = non-detect; the value in parenthesis is the associated reporting limit

Table 2-3
2016 Resident Fish Monitoring - Adult Fish Field Data and PCB Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Sample Area	Species	Sample ID	Date Collected	Length (cm)	Weight (g)	Fish Collection Location	Lipid (percent)	PCB (mg/kg wet)	PCB (mg/kg-lipid)
Background	Smallmouth bass	FS8-1907-SB	8/24/16	27.2	337	N44.99655 W74.88932	3.55	ND (0.05)	0.70
		FS8-1908-SB	8/24/16	27.0	294	N44.99804 W74.87912	2.37	ND (0.05)	1.1
		FS8-1914-SB	8/25/16	48.5	1793	N44.99037 W74.88625	2.73	0.215	7.9
		FS8-2221-SB	9/15/16	42.2	1441	N44.99025 W74.88621	6.07	0.106	1.7
		FS8-2225-SB	9/27/16	25.2	278	N44.99410 W74.89086	3.07	ND (0.05)	0.81
	Brown bullhead	FS8-2226-SB	9/27/16	26.1	323	N44.99873 W74.88817	1.59	ND (0.05)	1.6
		FS8-1899-BB	8/24/16	26.0	262	N44.93897 W74.99944	1.60	ND (0.05)	1.6
		FS8-1900-BB	8/24/16	25.2	229	N44.93926 W74.99859	1.58	ND (0.05)	1.6
		FS8-1901-BB	8/24/16	25.4	239	N44.93904 W74.99923	0.959	ND (0.05)	2.6
		FS8-1902-BB	8/24/16	25.0	224	N44.93849 W74.99996	1.15	ND (0.05)	2.2
Site	Smallmouth bass	FS7-1837-SB	8/22/16	38.4	1054	N44.98680 W74.74879	2.72	7.14	263
		FS7-1838-SB	8/22/16	35.5	829	N44.98657 W74.75023	1.84	0.904	49
		FS7-1839-SB	8/22/16	42.4	1223	N44.98643 W74.75005	3.70	5.11	138
		FS7-1840-SB	8/22/16	40.5	1216	N44.98644 W74.75090	0.946	2.36	249
		FS7-1841-SB	8/22/16	44.7	1436	N44.98666 W74.75057	1.19	2.06	173
		FS7-1842-SB	8/22/16	38.5	1135	N44.98624 W74.75474	2.39	2.06	86
	Brown bullhead	FS7-1956-BB	9/6/16	33.4	479	N44.98654 W74.74268	0.335	ND (0.05)	7.5
	White sucker	FS7-1858-WS	8/23/16	42.5	769	N44.98674 W74.74732	0.351	ND (0.05)	7.1
		FS7-1859-WS	8/23/16	42.6	915	N44.98656 W74.74286	0.602	ND (0.05)	4.2
		FS7-1887-WS	8/23/16	45.6	1147	N44.98661 W74.74960	0.411	ND (0.05)	6.1
FS7-1889-WS		8/23/16	44.0	963	N44.98670 W74.74724	0.843	0.289	34	
Downstream	Smallmouth bass	FS7-1890-WS	8/23/16	41.1	889	N44.98623 W74.75470	0.638	ND (0.05)	3.9
		FS9-1843-SB	8/22/16	46.5	1797	N44.98803 W74.73863	1.71	0.622	36
		FS9-1844-SB	8/22/16	42.0	1145	N44.98842 W74.73642	0.392	0.441	113
		FS9-1845-SB	8/22/16	41.6	1318	N44.98771 W74.74031	2.08	10.9	523
		FS9-1864-SB	8/23/16	48.5	1609	N44.98817 W74.73982	3.44	0.785	23
	Brown bullhead	FS9-1865-SB	8/23/16	49.4	1860	N44.98810 W74.73852	3.66	3.03	83
		FS9-1891-SB	8/23/16	31.6	558	N44.98826 W74.73977	3.71	0.664	18
		FS9-1846-BB	8/22/16	26.0	223	N44.98823 W74.73745	0.527	0.118	22
	White sucker	FS9-1847-BB	8/22/16	23.4	155	N44.98776 W74.74007	0.151	ND (0.05)	17
		FS9-1892-BB	8/23/16	32.6	545	N44.98841 W74.73588	2.29	2.35	103
		FS9-1860-WS	8/23/16	44.0	1007	N44.98804 W74.73898	1.15	ND (0.05)	2.2
		FS9-1861-WS	8/23/16	41.5	863	N44.98816 W74.73804	0.244	ND (0.05)	10
		FS9-1863-WS	8/23/16	29.1	274	N44.98826 W74.73976	0.132	ND (0.05)	19

Notes:

1. Approximate sample collection locations are shown on Figures 2-1 and 2-2.
2. Eight white sucker were collected as substitute species due to limited availability of brown bullhead at the site and downstream.
3. cm = centimeter
4. g = gram
5. mg/kg wet = milligrams per kilogram wet weight
6. mg/kg-lipid = milligrams per kilogram lipid normalized; half the detection limit was used for calculating lipid-normalized PCB concentrations for non-detect samples
7. ND = non-detect; the value in parenthesis is the associated reporting limit

Table 2-4
2016 Long-Term Monitoring Sediment Sampling Analytical Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Constituents	Capped Locations ¹										Supplemental (Uncapped) Locations ¹								
	SED-A-8	SED-A-25/32	SED-C-36/37	SED-C-45/63/64	SED-D-41	SED-D-46	SED-D-82	SED-D-117/118	SED-D-124	SED-D-126	SED-A-3	SED-A-10	SED-A-18	SED-A-19	SED-A-20	SED-A-21	SED-A-22	SED-A-30	SED-C-7
PAHs (mg/kg) ^{2,3,4}																			
Acenaphthene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	ND(0.0173)	ND(0.0091)	ND(0.0092)	0.0104	0.0381	0.0197	ND(0.0209)	0.0326	0.82
Acenaphthylene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	ND(0.0173)	ND(0.0091)	ND(0.0092)	ND(0.0098)	ND(0.0108)	ND(0.0152)	ND(0.0209)	ND(0.016)	ND(0.0137)
Anthracene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	ND(0.0173)	ND(0.0091)	ND(0.0092)	0.037	0.28	0.068	0.0427	0.0487	0.479
Benzo(a)anthracene	ND(0.009)	0.0251	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	0.0373	0.0491	ND(0.0091)	ND(0.0092)	0.294	2.42	0.596	0.323	0.601	6.66
Benzo(a)pyrene	ND(0.009)	0.0256	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	0.0494	0.0551	ND(0.0091)	ND(0.0092)	0.33	2.57	0.672	0.228	0.712	5.34
Benzo(b)fluoranthene	0.0128	0.0815	ND(0.0083)	ND(0.0083)	0.0411	0.0314	0.027	NS	0.0159	0.124	0.141	0.0202	0.0248	1.03	7.97	2.34	0.718	2.37	17.00
Benzo(g,h,i)perylene	ND(0.009)	0.0195	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	0.0389	0.0491	ND(0.0091)	ND(0.0092)	0.189	1.23	0.429	0.123	0.463	2.09
Benzo(k)fluoranthene	ND(0.009)	0.0673	ND(0.0083)	ND(0.0083)	0.0339	0.0259	0.0206	NS	0.0122	0.051	0.0396	ND(0.0091)	ND(0.0092)	0.25	1.67	0.548	0.212	0.567	4.98
Chrysene	0.0099	0.052	ND(0.0083)	ND(0.0083)	0.034	0.0211	ND(0.0145)	NS	ND(0.0085)	0.13	0.109	0.0144	0.0172	0.861	7.26	1.74	1.03	1.94	19.9
Dibenz(a,h)anthracene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	0.0144	ND(0.0173)	ND(0.0091)	ND(0.0092)	0.0506	0.381	0.127	0.0371	0.112	0.791
Fluoranthene	ND(0.009)	0.0376	ND(0.0083)	ND(0.0083)	0.0176	0.0231	0.0191	NS	ND(0.0085)	0.0217	0.0618	0.0104	ND(0.0092)	0.363	2.81	0.613	0.426	0.809	14.1
Fluorene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	ND(0.0173)	ND(0.0091)	ND(0.0092)	ND(0.0098)	0.0246	ND(0.0152)	ND(0.0209)	ND(0.016)	0.273
Indeno(1,2,3-cd)pyrene	ND(0.009)	0.0159	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	0.0325	0.0397	ND(0.0091)	ND(0.0092)	0.147	1.04	0.344	0.0971	0.35	1.84
Napthalene	ND(0.009)	ND(0.0109)	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	ND(0.0173)	ND(0.0091)	ND(0.0092)	ND(0.0098)	ND(0.0108)	0.0199	ND(0.0209)	ND(0.016)	0.0364
Phenanthrene	ND(0.009)	0.0138	ND(0.0083)	ND(0.0083)	ND(0.0136)	ND(0.0166)	ND(0.0145)	NS	ND(0.0085)	ND(0.0089)	0.0292	ND(0.0091)	ND(0.0092)	0.0431	0.185	0.0723	0.044	0.0684	0.381
Pyrene	ND(0.009)	0.0315	ND(0.0083)	ND(0.0083)	0.0147	0.0184	0.0158	NS	ND(0.0085)	0.0175	0.0507	ND(0.0091)	ND(0.0092)	0.266	1.740	0.444	0.282	0.635	11.600
Total	0.0227	0.3698	ND	ND	0.1413	0.1199	0.0825	NS	0.0281	0.5167	0.6243	0.045	0.042	3.8711	29.619	8.033	3.563	8.709	86.290
PCBs (ug/g) ^{2,3,4}																			
Aroclor 1016	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Aroclor 1221	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	0.566 PB	--	--	--	--	4.6	--	--	--	--
Aroclor 1232	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Aroclor 1242	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	0.576 AD	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	0.792 AD	--	--	--	--	4.53	--	--	--	--
Aroclor 1248	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Aroclor 1254	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Aroclor 1260	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	0.407	--	--	--	--
Aroclor 1262	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Aroclor 1268	ND(0.0677)	ND(0.0820)	ND(0.0646)	ND(0.0654)	ND(0.0947)	ND(0.0144)	ND(0.0857)	NS	ND(0.0687) [ND(0.0649)]	ND(0.0697)	--	--	--	--	ND(0.347)	--	--	--	--
Total	ND	ND	ND	ND	ND	0.576	ND	NS	ND [ND]	1.358	--	--	--	--	9.537	--	--	--	--
TDBFs (ng/kg) ^{2,4}																			
2,3,7,8-TCDF	--	1.4 [1.9]	ND(1.0)	--	--	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PeCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PeCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HxCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2-4
2016 Long-Term Monitoring Sediment Sampling Analytical Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Constituents	Capped Locations ¹										Supplemental (Uncapped) Locations ¹								
	SED-A-8	SED-A-25/32	SED-C-36/37	SED-C-45/63/64	SED-D-41	SED-D-46	SED-D-82	SED-D-117/118	SED-D-124	SED-D-126	SED-A-3	SED-A-10	SED-A-18	SED-A-19	SED-A-20	SED-A-21	SED-A-22	SED-A-30	SED-C-7
1,2,3,6,7,8-HxCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HxCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HxCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HpCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	9.2 J	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HpCDF	--	ND(5.0) [ND(5.0)]	ND(5.0)	--	--	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--
OCDF	--	ND(10.0) [ND(10.0)]	ND(10.0)	--	--	13.0 J	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	1.4 [1.9]	ND	--	--	25.0	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC (mg/kg) ^{3,5}																			
TOC	2,200	7,200	1,100	1,200	9,700	19,000	9,550	NS	1,530	7,900	16,000	2,420	2,890	17,500	15,400	15,900 [14,100]	28,500	35,600	20,000
Percent Moisture (%) ³																			
Percent Moisture	27.2	41.0	24.1	26.3	47.6	65.9	43.4	NS	28.3	28.9	58.1	26.3	29.3	33.6	44.5	59.9	61.8	56.1	46.1

Table 2-4
2016 Long-Term Monitoring Sediment Sampling Analytical Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Constituents	Supplemental (Uncapped) Locations ¹																
	SED-C-9	SED-C-30	SED-C-58	SED-C-88	SED-C-89	SED-D-27	SED-D-36	SED-D-59	SED-D-62	SED-D-85	SED-D-96	SED-D-102	SED-D-108	SED-D-116	SED-D-122	SED-D-130	SED-D-142
PAHs (mg/kg) ^{2,3,4}																	
Acenaphthene	ND(0.0336)	ND(0.0116)	ND(0.0111)	NS	NS	0.312	ND(0.0235)	0.0155	ND(0.028)	ND(0.0186)	NA	0.0329	0.05	0.0378	NA [ND(0.0089)]	ND(0.0147) [ND0.0185]]	ND(0.0186)
Acenaphthylene	ND(0.0336)	ND(0.0116)	ND(0.0111)	NS	NS	ND(0.0125)	ND(0.0235)	ND(0.0111)	ND(0.028)	ND(0.0186)	NA	ND(0.0123)	ND(0.0112)	ND(0.0146)	NA [ND(0.0089)]	ND(0.0147) [ND0.0185]]	ND(0.0186)
Anthracene	ND(0.0336)	ND(0.0116)	0.0137	NS	NS	0.307	ND(0.0235)	0.0306	ND(0.028)	0.0341	NA	0.0466	0.05	0.0716	NA [0.0104]	0.0306 [0.0251]	0.0218
Benzo(a)anthracene	ND(0.0336)	0.0267	0.0504	NS	NS	1.34	0.0491	0.266	0.0307	0.357	NA	0.384	0.381	0.695	NA [0.197]	0.0705 [0.113]	0.146
Benzo(a)pyrene	ND(0.0336)	0.0217	0.0612	NS	NS	1.3	0.0463	0.292	ND(0.028)	0.436	NA	0.42	0.497	0.931	NA [0.288]	0.0657 [0.122]	0.136
Benzo(b)fluoranthene	0.0671	0.0578	0.173	NS	NS	3.03	0.128	0.997	0.0893	1.4	NA	1.44	1.37	2.87	NA [1.03]	0.199 [0.296]	0.49
Benzo(g,h,i)perylene	ND(0.0336)	0.0162	0.0501	NS	NS	0.716	0.024	0.201	ND(0.028)	0.262	NA	0.28	0.346	0.674	NA [0.235]	0.0622 [0.0894]	0.102
Benzo(k)fluoranthene	0.0554	0.0258	0.0668	NS	NS	0.828	0.105	0.275	0.0737	0.355	NA	0.46	0.349	0.985	NA [0.297]	0.0604 [0.0827]	0.128
Chrysene	0.0392	0.0775	0.158	NS	NS	2.29	0.0654	0.767	0.065	1.08	NA	1.02	1.19	1.89	NA [0.838]	0.238 [0.261]	0.391
Dibenz(a,h)anthracene	ND(0.0336)	ND(0.0116)	0.0177	NS	NS	0.281	ND(0.0235)	0.0743	ND(0.028)	0.0893	NA	0.117	0.0993	0.244	NA [0.0727]	0.018 [0.0267]	0.0268
Fluoranthene	0.0375	0.029	0.0657	NS	NS	1.8	0.129	0.283	0.0479	0.364	NA	0.417	0.488	0.7580	NA [0.0139]	0.0672 [0.133]	0.201
Fluorene	ND(0.0336)	ND(0.0116)	ND(0.0111)	NS	NS	0.235	ND(0.0235)	ND(0.0111)	ND(0.028)	ND(0.0186)	NA	0.0181	0.0194	0.0288	NA [ND(0.0089)]	ND(0.0147) [ND0.0185]]	ND(0.0186)
Indeno(1,2,3-cd)pyrene	ND(0.0336)	0.0129	0.0412	NS	NS	0.636	ND(0.0235)	0.169	ND(0.028)	0.215	NA	0.255	0.276	0.589	NA [0.191]	0.0472 [0.073]	0.0768
Napthalene	ND(0.0336)	ND(0.0116)	ND(0.0111)	NS	NS	0.0697	ND(0.0235)	ND(0.0111)	ND(0.028)	ND(0.0186)	NA	0.0174	0.0158	0.0334	NA [ND(0.0089)]	ND(0.0147) [ND0.0185]]	ND(0.0186)
Phenanthrene	ND(0.0336)	ND(0.0116)	0.0269	NS	NS	1.26	0.0405	0.0631	ND(0.028)	0.0918	NA	0.182	0.109	0.357	NA [ND(0.0089)]	0.0254 [0.0498]	0.0256
Pyrene	ND(0.0336)	0.0218	0.0473	NS	NS	1.34	0.101	0.231	0.0373	0.309	NA	0.368	0.353	0.671	NA [0.0093]	0.0506 [0.109]	0.152
Total	0.1992	0.2894	0.772	NS	NS	15.7447	0.6883	3.665	0.3439	4.9932	NA	5.458	5.5935	10.8356	NA [3.1823]	0.9348 [1.3807]	1.897
PCBs (ug/g) ^{2,3,4}																	
Aroclor 1016	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Aroclor 1221	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	1.01	--	--	--	--
Aroclor 1232	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Aroclor 1242	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	1.02	--	--	--	--
Aroclor 1248	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Aroclor 1254	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Aroclor 1260	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	0.339	--	--	--	--
Aroclor 1262	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Aroclor 1268	ND(0.262)	--	--	--	--	--	ND(0.175)	--	ND(0.182)	--	ND(0.230)	--	ND(0.0819)	--	--	--	--
Total	ND	--	--	--	--	--	ND	--	ND	--	ND	--	2.369	--	--	--	--
TDBFs (ng/kg) ^{2,4}																	
2,3,7,8-TCDF	8.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8-PeCDF	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,7,8-PeCDF	11.0 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8-HxCDF	8.4 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2-4
2016 Long-Term Monitoring Sediment Sampling Analytical Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

Constituents	Supplemental (Uncapped) Locations ¹																
	SED-C-9	SED-C-30	SED-C-58	SED-C-88	SED-C-89	SED-D-27	SED-D-36	SED-D-59	SED-D-62	SED-D-85	SED-D-96	SED-D-102	SED-D-108	SED-D-116	SED-D-122	SED-D-130	SED-D-142
1,2,3,6,7,8-HxCDF	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6,7,8-HxCDF	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,7,8,9-HxCDF	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,6,7,8-HpCDF	18.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,3,4,7,8,9-HpCDF	ND(5.0)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
OCDF	26.0 J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	71.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC (mg/kg) ^{3,5}																	
TOC	40,000	20,000	7,200	NS	NS	16,000	31,000	16,000	37,000	20,000	84,200	12,000	13,400	12,000	2,200	29,300 [28,900]	28,000
Percent Moisture (%) ³																	
Percent Moisture	81.4	57.0	42.2	NS	NS	46.9	72.1	35.9	73.0	58.1	78.5	55.9	39.9	45.8	25.6	53.3	52.1

Table 2-4
2016 Long-Term Monitoring Sediment Sampling Analytical Results

2016 Long-Term Monitoring Data Summary Report
St. Lawrence River Remediation Project, Massena, New York

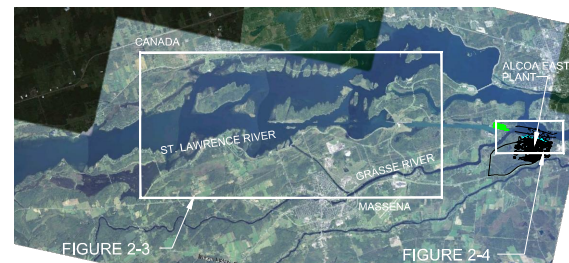
Notes:

- 1. Sample locations are provided on Figure 2-4.
- 2. Non-detect samples are listed with the practical quantitation limit in parentheses.
- 3. Duplicate results are presented in brackets.
- 4. Totals represent sum of all constituents listed.
- 5. In instances where four TOC replicate results were run by the laboratory, the average is provided.

Acronyms:

AD	Aroclor 1242 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
AF	Aroclor 1254 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
AG	Aroclor 1260 is being reported as the best Aroclor match. The sample exhibits an altered PCB pattern.
PB	Aroclor 1221 is being used to report an altered PCB pattern exhibited by the sample. Actual Aroclor 1221 is not present in the sample, but is reported to more accurately quantify PCB present in sample that has undergone environmental alteration.
J	An estimated concentration. The concentration result is greater than or equal to the Method Detection Limit but less than the Reporting Limit.
ND	Analyte not detected at a concentration greater than the Practical Quantitation Limit.
NA	Sample not analyzed for PAHs due to lack of sample volume. Laboratory analyzed remaining material for TOC instead of PAHs.
NS	Location not sampled abandoned due to lack of recoverable materials (large cobble and rock present)
PAHs	polyaromatic hydrocarbons
PCBs	polychlorinated biphenyls
TDBFs	total dibenzofurans
TOC	total organic carbon
mg/kg	milligrams per kilogram
ug/g	micrograms per gram
ng/kg	nanograms per kilogram
--	Not targeted for analysis

FIGURES

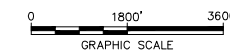


APPROXIMATE YOUNG-OF-YEAR
SPOTTAIL SHINER MONITORING
LOCATION

APPROXIMATE 2016 ADULT FISH
MONITORING LOCATIONS

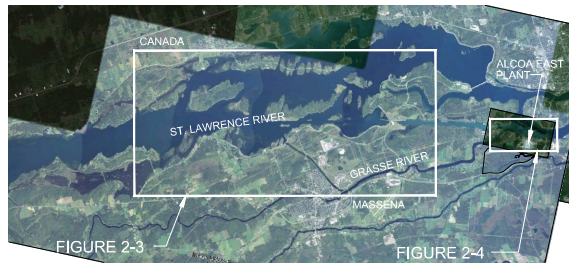
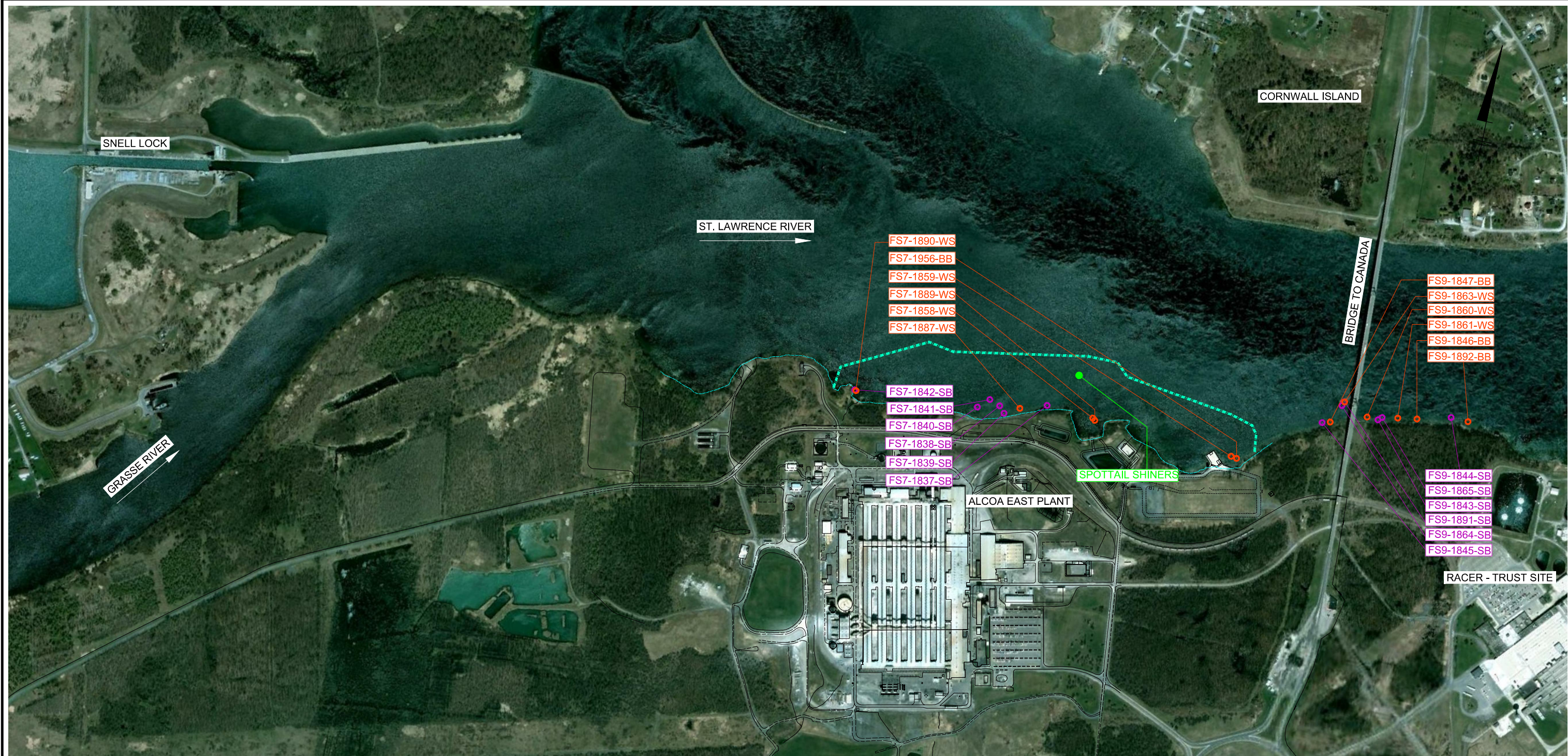
SB = SMALLMOUTH BASS
BB = BROWN BULLHEAD

1. AERIAL PHOTO OBTAINED FROM GOOGLE EARTH



ST. LAWRENCE RIVER REMEDIATION PROJECT
MASSENA, NEW YORK
**2016 LONG-TERM MONITORING
DATA SUMMARY REPORT**

FISH SAMPLE COLLECTION LOCATIONS - BACKGROUND



LEGEND:

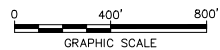
- APPROXIMATE YOUNG-OF-YEAR SPOTTAIL SHINER MONITORING LOCATION
- APPROXIMATE 2016 FISH MONITORING LOCATION
- FS7-1837-SB SAMPLE IDENTIFICATION NUMBER
- 2001 SLRRP REMEDIATION AREA

FISH SPECIES ABBREVIATIONS:

- SB = SMALLMOUTH BASS
- BB = BROWN BULLHEAD
- WS = WHITE SUCKER

NOTES:

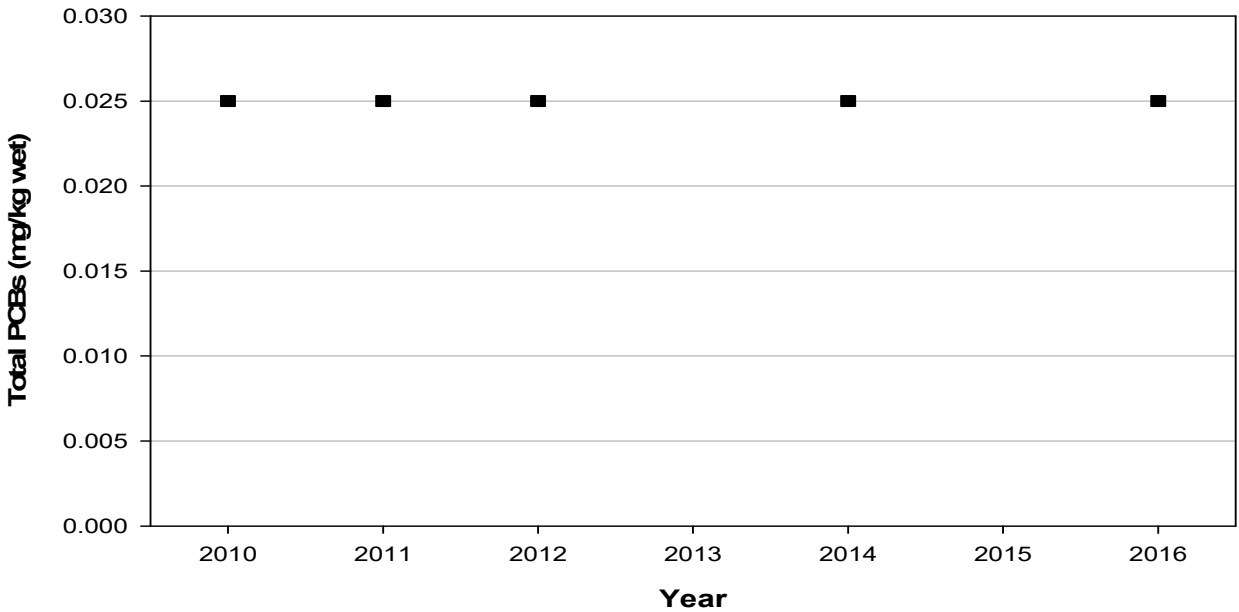
1. AERIAL PHOTO OBTAINED FROM GOOGLE EARTH



ST. LAWRENCE RIVER REMEDIATION PROJECT
MASSENA, NEW YORK
2016 LONG-TERM MONITORING
DATA SUMMARY REPORT

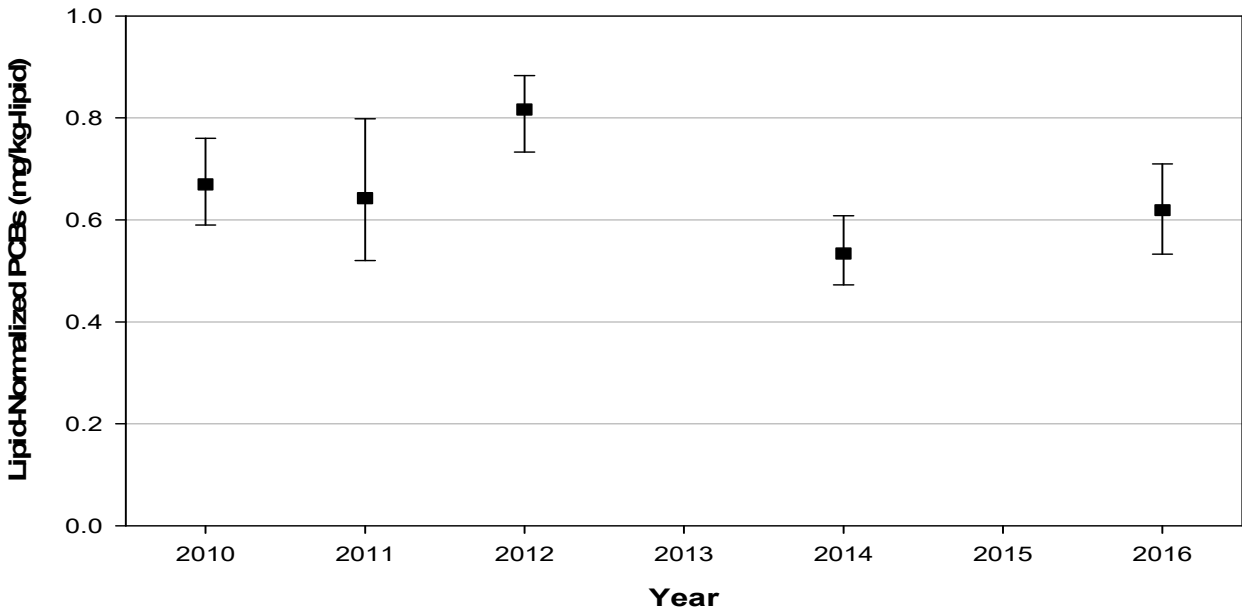
FISH SAMPLE COLLECTION LOCATIONS -
SITE AND DOWNSTREAM OF SITE

Background Area Young-of-Year Total PCBs



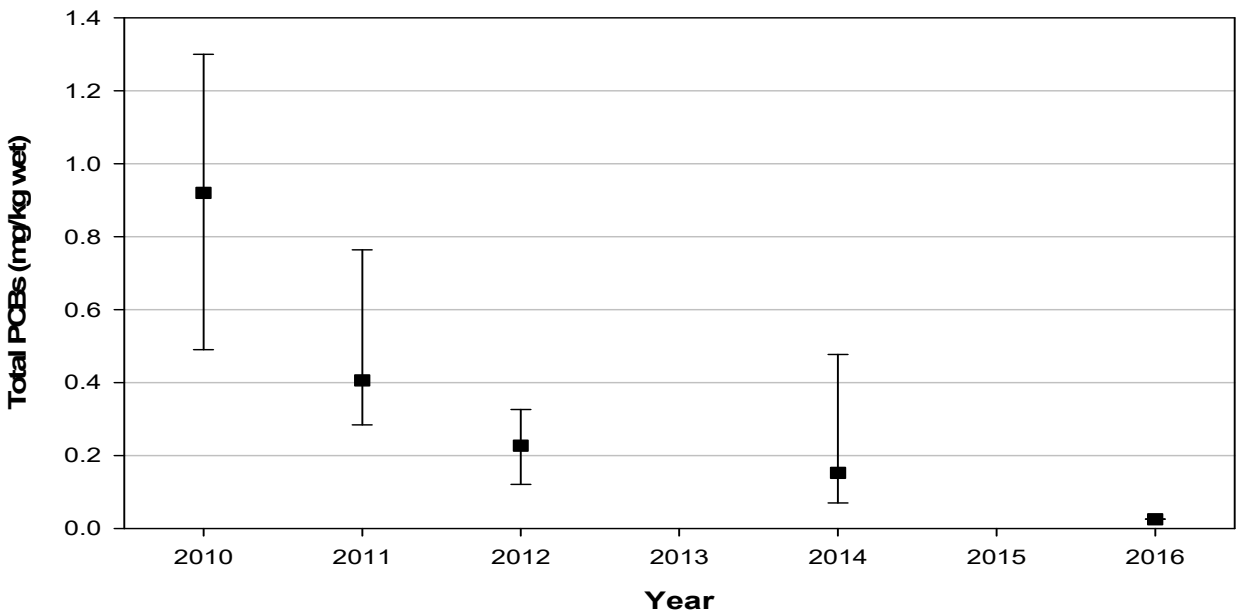
Note:
1. All PCB values in the background area were non-detect each year.
2. Values below detection set to half the detection limit for determining the average.

Background Area Young-of-Year Lipid-Normalized PCBs



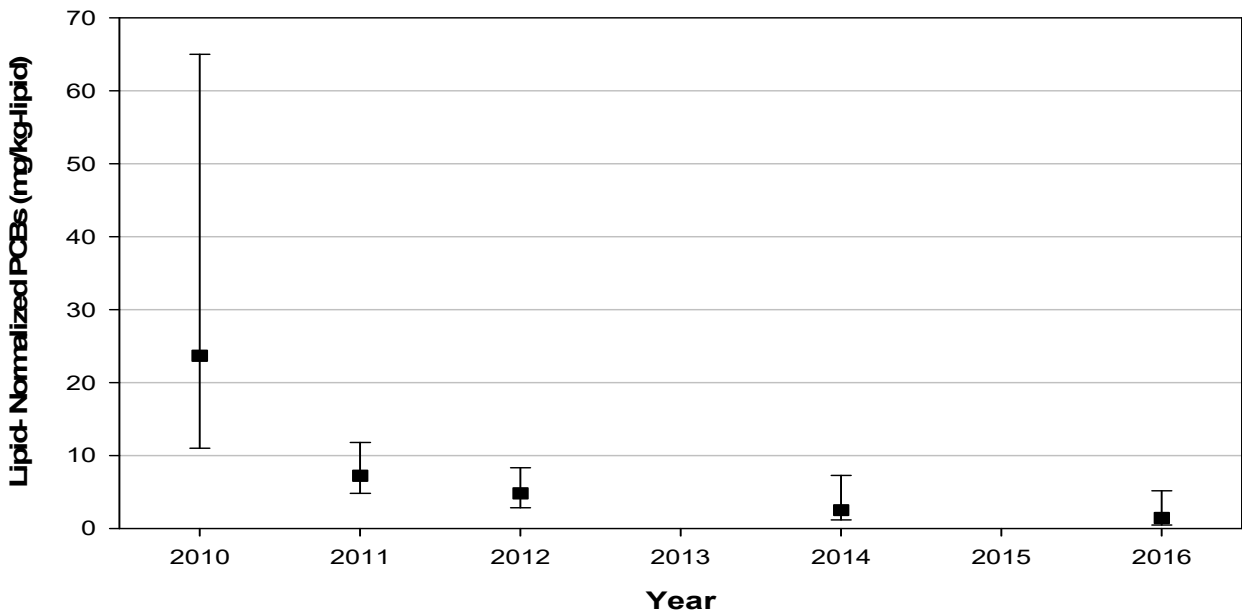
Note:
1. All PCB values in the background area were non-detect each year.
2. Values below detection set to half the detection limit for determining the average.

SLRRP Area Young-of-Year Total PCBs

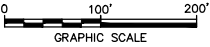


Note:
1. PCB values represent averages with minimum and maximum provided by the bars for each year.

SLRRP Area Young-of-Year Lipid-Normalized PCBs



Note:
1. PCB values represent averages with minimum and maximum provided by the bars for each year.



APPENDIX A

DATA VALIDATION REPORT

Data Validation Report – Stage 1

March 8, 2017

Project: Alcoa St. Lawrence River – 2016 Fish and Sediment

Project Number: E50002-09.01

Laboratory: Pace Analytical Services, Inc.

This report summarizes the review of 51 fish tissue samples, 68 sediment samples, six sediment field duplicate samples, and four rinse blank samples collected between August and September 2016. The samples were collected by Arcadis and submitted to Pace Analytical Services in Schenectady, New York (PACE-NY). Samples were subcontracted to Pace Analytical Services in Greensburg, Pennsylvania (PACE-PN), and Pace Analytical Services in Minneapolis, Minnesota (PACE-MN). The samples were analyzed for the following parameters:

- Polychlorinated biphenyl (PCB) Aroclors by U.S. Environmental Protection Agency (USEPA) method 8082A
- Total organic carbon by the Lloyd Kahn method
- Percent moisture by USEPA method 160.3 and ASTM International method D2974-87
- Polycyclic aromatic hydrocarbons (PAHs) by USEPA 8270D select ion monitoring
- Polychlorinated dibenzo-p-dioxins and polychlorodibenzofurans by USEPA method 8290

PACE-NY sample data group (SDG) numbers 16090569, 16090576, 16100000, 16100323, 16100332, 16100334, 16100335, and 16100336; PACE-PA SDG numbers 30197788, 30197980, and 30198416; and PACE-MN SDG numbers 10364774 and 10367063 were reviewed in this report. Sample IDs, matrices, and analyses are presented in Table 1.

Table 1
Sample Summary

Field Sample ID	Lab SDG	Lab Sample ID	Matrix	Analyses
A-10_20160927	16090569	AT26521	Sediment	TOC, % moisture
	30198416	30198416015		PAHs, % moisture
A-18_20160927	16090569	AT26522	Sediment	TOC, % moisture
	30198416	30198416016		PAHs, % moisture
A-19_20160927	16090569	AT26520	Sediment	TOC, % moisture
	30198416	30198416014		PAHs, % moisture
A-20_20160927	16090569	AT26519	Sediment	PCBs, TOC, % moisture
	30198416	30198416013		PAHs, % moisture
A-21_20160927	16090569	AT26517	Sediment	TOC, % moisture
	30198416	30198416012		PAHs, % moisture

Field Sample ID	Lab SDG	Lab Sample ID	Matrix	Analyses
A-22_20160927	16090569	AT26515	Sediment	TOC, % moisture
	30198416	30198416010		PAHs, % moisture
A-25/32_20160927	10364774	10364774001	Sediment	PCDF
	16100000	AT26542		PCBs, TOC, % moisture
	30197980	30197980001		PAHs, % moisture
A-3_20160927	16100000	AT26545	Sediment	TOC, % moisture
	30197980	30197980003		PAHs, % moisture
A-30_20160926	16090569	AT26516	Sediment	TOC, % moisture
	30198416	30198416011		PAHs, % moisture
A-8_20160927	16100000	AT26544	Sediment	PCBs, TOC, % moisture
	30197980	30197980002		PAHs, % moisture
C-30_20160927	16100000	AT26548	Sediment	TOC, % moisture
	30197980	30197980006		PAHs, % moisture
C-36/37_20160927	16090576	AT26529	Sediment	PCBs, TOC, % moisture
	30197788	30197788005		PAHs, % moisture
	10368367	10368367001		PCDF, % moisture
C-45/63/64_20160927	16100000	AT26551	Sediment	PCBs, TOC, % moisture
	30197980	30197980009		PAHs, % moisture
C-58_20160927	16100000	AT26552	Sediment	TOC, % moisture
	30197980	30197980010		PAHs, % moisture
C-7_20160927	16090576	AT26532	Sediment	TOC, % moisture
	30197788	30197788008		PAHs, % moisture
C-9_20160927	10364774	10364774004	Sediment	PCDF
	16100000	AT26550		PCBs, TOC, % moisture
	30197980	30197980008		PAHs, % moisture
D-102_20160927	16090576	AT26531	Sediment	TOC, % moisture
	30197788	30197788007		PAHs, % moisture
D-108_20160926	16090569	AT26503	Sediment	PCBs, TOC, % moisture
	30198416	30198416001		PAHs, % moisture
D-116_20160927	16090576	AT26530	Sediment	TOC, % moisture
	30197788	30197788006		PAHs, % moisture
D-122_20160926	16090569	AT26504	Sediment	TOC, % moisture
D-124_20160926	16090569	AT26506	Sediment	PCBs, TOC, % moisture
	30198416	30198416003		PAHs, % moisture
D-126_20160927	16100000	AT26546	Sediment	PCBs, TOC, % moisture
	30197980	30197980004		PAHs, % moisture
D-130_20160926	16090569	AT26508	Sediment	TOC, % moisture
	30198416	30198416004		PAHs, % moisture

Field Sample ID	Lab SDG	Lab Sample ID	Matrix	Analyses
D-142_20160926	16090569	AT26514	Sediment	TOC, % moisture
	30198416	30198416009		PAHs, % moisture
D-27_20160927	16100000	AT26547	Sediment	TOC, % moisture
	30197980	30197980005		PAHs, % moisture
D-36_20160927	16090576	AT26534	Sediment	PCBs, TOC, % moisture
	30197788	30197788010		PAHs, % moisture
D-41_20160927	16090576	AT26533	Sediment	PCBs, TOC, % moisture
	30197788	30197788009		PAHs, % moisture
D-46_20160927	10364774	10364774003	Sediment	PCDF
	16100000	AT26549		PCBs, TOC, % moisture
	30197980	30197980007		PAHs, % moisture
D-59_20160927	16090576	AT26536	Sediment	TOC, % moisture
	30197788	30197788012		PAHs, % moisture
D-62_20160927	16090576	AT26535	Sediment	PCBs, TOC, % moisture
	30197788	30197788011		PAHs, % moisture
D-82_20160926	16090569	AT26513	Sediment	PCBs, TOC, % moisture
	30198416	30198416008		PAHs, % moisture
D-85_20160927	16090576	AT26537	Sediment	TOC, % moisture
	30197788	30197788013		PAHs, % moisture
D-96_20160926	16090569	AT26511	Sediment	PCBs, TOC, % moisture
DUP-1_20160926	30198416	30198416002	Sediment	PAHs, % moisture
DUP-2_20160926	16090569	AT26507	Sediment	PCBs
DUP-3_20160926	16090569	AT26509	Sediment	TOC
DUP-4_20160926	30198416	30198416007	Sediment	PAHs, % moisture
DUP-6_20160926	16090569	AT26518	Sediment	TOC
DUP-7_20160927	10364774	10364774002	Sediment	PCDF
RB-20160926-AM	16090576	AT26538	Water QC	PCBs
	30197788	30197788001		PAHs
RB-20160926-PM	30197788	30197788002	Water QC	PAHs
RB-20160927-AM	16090576	AT26540	Water QC	PCBs
	30197788	30197788003		PAHs
RB-20160927-PM	16090576	AT26541	Water QC	PCBs
	30197788	30197788004		PAHs
FS7-1837-SB	16100332	AT28181	Tissue	PCBs, lipids
FS7-1848-SS	16100323	AT28113	Tissue	PCBs, lipids
FS7-1849-SS	16100323	AT28114	Tissue	PCBs, lipids
FS7-1850-SS	16100323	AT28115	Tissue	PCBs, lipids
FS7-1851-SS	16100323	AT28116	Tissue	PCBs, lipids

Field Sample ID	Lab SDG	Lab Sample ID	Matrix	Analyses
FS7-1852-SS	16100323	AT28117	Tissue	PCBs, lipids
FS7-1853-SS	16100323	AT28118	Tissue	PCBs, lipids
FS7-1854-SS	16100323	AT28119	Tissue	PCBs, lipids
	10367063	10367063001		PCDF
FS7-1855-SS	16100323	AT28120	Tissue	PCBs, PCDF, Lipids
FS7-1856-SS	16100323	AT28121	Tissue	PCBs, PCDF, Lipids
	10367063	10367063002		PCDF
FS7-1857-SS	16100323	AT28122	Tissue	PCBs, PCDF, Lipids
	10367063	10367063003		PCDF
FS8-1909-SS	16100323	AT28123	Tissue	PCBs, PCDF, Lipids
FS8-1910-SS	16100323	AT28124	Tissue	PCBs, PCDF, Lipids
FS8-1911-SS	16100323	AT28125	Tissue	PCBs, PCDF, Lipids
FS8-1912-SS	16100323	AT28126	Tissue	PCBs, PCDF, Lipids
FS8-1913-SS	16100323	AT28127	Tissue	PCBs, PCDF, Lipids
	10367063	10367063004		PCDF
FS7-1838-SB	16100332	AT28182	Tissue	PCBs, lipids
FS7-1839-SB	16100332	AT28183	Tissue	PCBs, lipids
FS7-1840-SB	16100332	AT28184	Tissue	PCBs, lipids
FS7-1841-SB	16100332	AT28185	Tissue	PCBs, lipids
FS7-1842-SB	16100332	AT28186	Tissue	PCBs, lipids
FS9-1843-SB	16100332	AT28187	Tissue	PCBs, lipids
FS9-1844-SB	16100332	AT28188	Tissue	PCBs, lipids
FS9-1845-SB	16100332	AT28189	Tissue	PCBs, lipids
FS9-1846-BB	16100332	AT28190	Tissue	PCBs, lipids
FS9-1847-BB	16100332	AT28191	Tissue	PCBs, lipids
FS9-1864-SB	16100332	AT28192	Tissue	PCBs, lipids
FS9-1865-SB	16100332	AT28193	Tissue	PCBs, lipids
FS9-1891-SB	16100332	AT28194	Tissue	PCBs, lipids
FS9-1892-BB	16100332	AT28195	Tissue	PCBs, lipids
FS8-1899-BB	16100334	AT28197	Tissue	PCBs, lipids
FS8-1900-BB	16100334	AT28198	Tissue	PCBs, lipids
FS8-1901-BB	16100334	AT28199	Tissue	PCBs, lipids
FS8-1902-BB	16100334	AT28200	Tissue	PCBs, lipids
FS8-1903-BB	16100334	AT28201	Tissue	PCBs, lipids
FS8-1904-BB	16100334	AT28202	Tissue	PCBs, lipids
FS8-1907-SB	16100334	AT28203	Tissue	PCBs, lipids
FS8-1908-SB	16100334	AT28204	Tissue	PCBs, lipids
FS8-1914-SB	16100334	AT28210	Tissue	PCBs, lipids

Field Sample ID	Lab SDG	Lab Sample ID	Matrix	Analyses
FS7-1858-WS	16100336	AT28212	Tissue	PCBs, lipids
FS7-1859-WS	16100336	AT28213	Tissue	PCBs, lipids
FS7-1887-WS	16100336	AT28214	Tissue	PCBs, lipids
FS7-1889-WS	16100336	AT28215	Tissue	PCBs, lipids
FS7-1890-WS	16100336	AT28216	Tissue	PCBs, lipids
FS8-2221-SB	16100336	AT28217	Tissue	PCBs, lipids
FS8-2225-SB	16100336	AT28221	Tissue	PCBs, lipids
FS8-2226-SB	16100336	AT28222	Tissue	PCBs, lipids
FS9-1860-WS	16100336	AT28218	Tissue	PCBs, lipids
FS9-1861-WS	16100336	AT28219	Tissue	PCBs, lipids
FS9-1863-WS	16100336	AT28220	Tissue	PCBs, lipids

Notes:

Collection dates have been appended to non-unique sample IDs to distinguish database records for samples collected in 2016 from samples collected in previous years.

?: percent

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

PCDF: polychlorodibenzofuran

QC: quality control

SDG: sample data group

TOC: total organic carbon

Field Documentation and Sample Analyses

Field documentation was checked for completeness and accuracy. The chain-of-custody (COC) forms were signed by each laboratory at the time of sample receipt; the samples were received cold and in good condition. Samples A-22, A-30, A-21, DUP-6, A-20, A-19, A-10, and A-18 reported under SDGs 16090569 and 30198416 were logged by the laboratories with the collection date of 9/26/16. The associated COC forms indicate samples were collected on 9/27/16. There were no comments in the sample receipt forms noting this discrepancy and results were not impacted.

PCB Aroclor analysis was requested on the COC form for sample RB-20160926, but no corresponding data were reported for this sample. Sample RB-20160927 was requested for dioxin/furans, but no corresponding data were reported for this sample. Samples D-96 and D-122 were submitted for PAH analysis but not analyzed. A duplicate of D-122 was analyzed for PAHs under sample ID DUP-1. There were no comments in the final laboratory reports noting these discrepancies.

Holding Times and Sample Preservation

All samples were appropriately preserved and prepared and analyzed within recommended holding times.

Method Blanks

Method blanks were analyzed at the required frequencies and were free of target analytes with the following exceptions:

- **Lipids:** The lipid method blanks for SDGs 16100332, 16100335, and 16100336 results were greater than the laboratory reporting limit. Associated sample results were significantly greater than the concentrations in the blank; therefore, results were not significantly impacted, except for samples FS9-1847-BB, FS7-1858-WS, FS7-1887-WS, FS9-1861-WS, and FS9-1863-WS. These sample results were less than five times the concentrations in the method blanks and may be biased high.
- **PCBs:** A batch method blank was not analyzed with samples RB-20160926-AM, RB-201627-AM, and RB-20160927-PM. Sample results were undetected for all Aroclors, so results are not expected to be impacted.

Surrogate Recoveries

All surrogates were added per method requirements and recoveries were within control limits with the following exceptions for PAHs:

- The matrix spike (MS) and matrix spike duplicate (MSD) surrogate percent recoveries of terphenyl-d14 fell outside the control limit low for samples D-130 and A-22. The sample surrogate percent recovery of terphenyl-d14 fell outside the control limits low for samples RB-20160927-PM, D-102, C-7, D-41, D-36, D-62, D-46, C-9, D-130, DUP-4, D-82, A-22, and A-10. Results associated with these surrogates may be biased low.

Laboratory Control Samples

Laboratory control samples (LCS) were analyzed at required frequencies and resulted in recoveries within laboratory control limits.

Matrix Spike Samples and Matrix Spike Duplicate Samples

MS and MSD samples were analyzed on project samples at the required frequencies or LCSs were analyzed in place of MS/MSDs—except for sample D-82, which was requested for PCB MS/MSD analyses on the COC form but was not analyzed by the laboratory. MS/MSDs analyzed on non-project samples were not evaluated. All recoveries and/or relative percent difference (RPD) values were within laboratory control limits with following exceptions:

- **PCBs:** The primary and confirmation MSD recoveries of Aroclor 1248 were below the control limit for sample D-96. The primary MS recovery of Aroclor 1248 was above the control limit for sample FS8-2226-SB.
- **PAHs:** The MS percent recoveries of benzo(a)pyrene and benzo(b)fluoranthene were above the control limit for sample A-22. The associated MSD recovered below the control limit for

chrysene, and the associated MS/MSD RPD values were above the control limit for benzo(a)pyrene, chrysene, and fluoranthene. The MSD recoveries of benzo(k)fluoranthene were below the control limit for samples RB-20160926-AM and A-25/32. The associated MS/MSD RPD values were above the control limit for benzo(k)fluoranthene in both samples.

Associated parent sample results for MS or MSD recoveries outside of control limits may be estimated.

Laboratory Duplicates

Laboratory duplicates were analyzed at the required frequency or precision was evaluated with LCS/LCSDs and/or MS/MSDs. Duplicates analyzed on non-project samples were not evaluated. Duplicate results were within laboratory control limits except for the lipid duplicate analyzed with sample 16100336. The associated sample results may be estimated.

Field Quality Control Samples

Four rinse blanks were collected in association with these sample sets. No detected results were noted in any of the blanks.

Field Duplicates

Field duplicates were collected at the required frequency. Six field duplicates were collected in association with these sample sets. Detected results are summarized in Table 2.

Table 2
Field Duplicate Summary

Parameter	A-21	DUP-6	RPD
Total organic carbon	15,900 mg/kg	14,100 mg/kg	12%

Parameter	A-25/32	DUP-7	RPD
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	34 ng/kg	52 ng/kg	42%
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	0.75U ng/kg	7.7 ng/kg	200%
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	1.4 ng/kg	1.9 ng/kg	30%
Total Heptachlorodibenzo-p-dioxin (HpCDD)	0.75U ng/kg	16 ng/kg	200%
Total Pentachlorodibenzofuran (PeCDF)	21 ng/kg	54 ng/kg	88%
Total Tetrachlorodibenzofuran (TCDF)	57 ng/kg	100 ng/kg	55%

Parameter	D-130	DUP-3	RPD
Total organic carbon	29,300 mg/kg	289,00 mg/kg	1%

Parameter	D-130	DUP-4	RPD
Moisture, percent	55.1 %	64.3 %	15%
Anthracene	30.6 µg/kg	25.1 µg/kg	20%
Benzo(a)anthracene	70.5 µg/kg	113 µg/kg	46%
Benzo(a)pyrene	65.7 µg/kg	122 µg/kg	60%
Benzo(b)fluoranthene	199 µg/kg	296 µg/kg	39%
Benzo(g,h,i)perylene	62.2 µg/kg	89.4 µg/kg	36%
Benzo(k)fluoranthene	60.4 µg/kg	82.7 µg/kg	31%
Chrysene	238 µg/kg	261 µg/kg	9%
Dibenzo(a,h)anthracene	18 µg/kg	26.7 µg/kg	39%
Fluoranthene	67.2 µg/kg	133 µg/kg	66%
Indeno(1,2,3-c,d)pyrene	47.2 µg/kg	73 µg/kg	43%
Phenanthrene	25.4 µg/kg	49.8 µg/kg	65%
Pyrene	50.6 µg/kg	109 µg/kg	73%

Notes:

µg/kg: microgram per kilogram

mg/kg: milligram per kilogram

ng/kg: nanogram per kilogram

RPD: relative percent difference

Overall Assessment

The laboratory followed the specified analytical methods and all requested sample analyses were completed, with the exceptions noted above. Accuracy was acceptable as demonstrated by the surrogate, LCS, and MS/MSD recoveries, with the exceptions noted above. Precision was also acceptable as demonstrated by the laboratory duplicates and MS/MSD RPD values, with the exceptions noted above. Data are acceptable as reported and in accordance with the USEPA Stage 1 validation (USEPA 2009), qualifiers were not applied to results reviewed in this report.

Reference

USEPA (U.S. Environmental Protection Agency), 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. USEPA Office of Solid Waste and Emergency Response. USEPA 540-R-08-005. January 2009.